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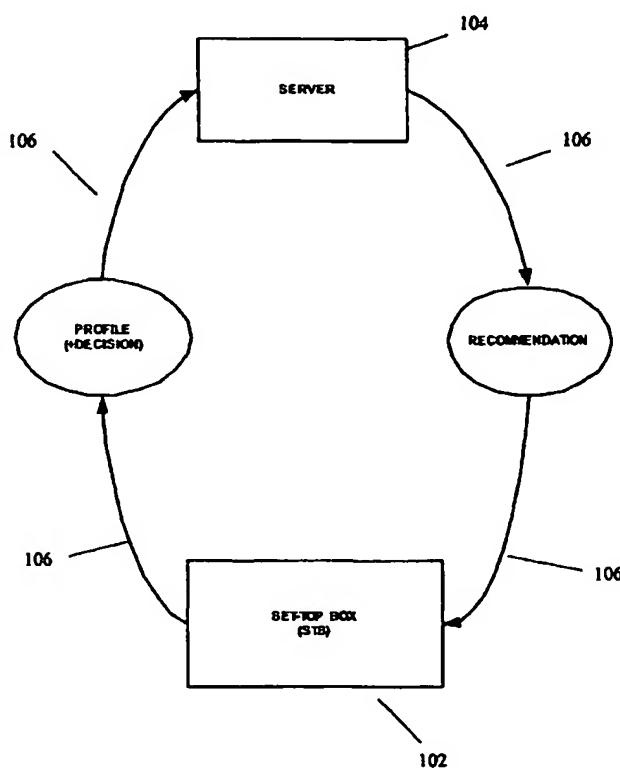
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(54) Title: **PRIVACY-MAINTAINING METHODS AND SYSTEMS FOR COLLECTING INFORMATION**



(57) Abstract: A method and system for collecting and aggregating information (Fig. 1) from user terminals, such as set-top boxes (STBs) that may employ electronic programming guide (EPG) features, without the necessity of collecting or storing personal, private user information. The invention also enables collaborative filtering and the generation of recommended future decisions based on anonymous user profile information.

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**PRIVACY-MAINTAINING METHODS AND
SYSTEMS FOR COLLECTING INFORMATION**

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PRIORITY CLAIM

The present application claims priority to co-pending Provisional Application Patent Application serial no. 60/360,068 entitled "Privacy-Maintaining Methods and Systems for Collecting Information", filed on 10 February 25, 2002, and having a common inventive entity.

INCORPORATION BY REFERENCE

The present application for United States Patent incorporates by reference the following commonly-owned patent applications, as if set forth in their entirety herein, for all purposes:

WO 0120481A2 {Predictive Networks PCT application};
PCT Application No. PCT/US02/____ entitled "Compact
Implementations For Limited-Resource Platforms" filed May 15, 2002;
20 U.S. Patent Application No. 60/338,398 filed December 7, 2001;
U.S. Patent Application entitled: "Television Program Navigation
Guide" filed December 5, 2001;
U.S. Patent Application entitled: "Method and System for Selective
Initial Television Channel Display" filed October 22, 2001;
25 U.S. Patent Application No. 09/969,911 filed October 3, 2001;
U.S. Patent Application entitled: "Method and System for Parsing
Purchase Information from Web Pages filed August 29, 2001;
U.S. Patent Application No. 09/928,493 filed August 13, 2001;
U.S. Patent Application No. 09/877,974 filed June 7, 2001;
30 U.S. Patent Application No. 09/558,755 filed April 21, 2001;
U.S. Patent Application No. 60/282,028 filed April 6, 2001;
U.S. Patent Application No. 09/798,337 filed March 2, 2001;
U.S. Patent Application No. 09/777,807 filed February 5, 2001;
35 U.S. Patent Application No. 09/767,693 filed January 23, 2001; and
U.S. Patent Application No. 09/766,377 filed January 19, 2001.

BACKGROUND OF THE INVENTION

Collaborative filtering is a method that enables individuals to benefit from the aggregated knowledge, experience, and decision-making history of similarly-situated individuals. In general, collaborative filtering 5 operates by using the decisions a first individual makes to locate a group of other individuals who made similar decisions, and then using the aggregate decisions made by the group to suggest possible future (or alternative) actions by the first individual.

A well-known example of collaborative filtering is the “Others Who 10 Bought This Book Also Liked . . .” recommendations from various online booksellers such as Amazon.com.

However, in order for conventional collaborative filtering systems to operate, a detailed log of individual decision-making must be collected and stored by the operator of the system (or a proxy thereof). These logs often 15 contain personal, private information of individuals, and as a result, many individuals are reluctant to permit this information to be collected.

Moreover, legal restrictions may apply to the collection, storage, and subsequent use of such information. As a result, the gathering and storage of such logs is problematic.

20 These problems extend to the EPG/IPG environment, examples of which are set forth in the following U.S. and foreign patent documents, among others, the disclosures of which are incorporated herein by reference as if set forth in their entirety here:

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U.S. Pat. 6,177,931
U.S. Pat. 6,163,316
U.S. Pat. 6,005,597

Alexander et al.
Killian
Barrett et al.

WO 0049801A1
WO 0033224A1

Yuen et al.
Yuen

In the EPG environment, for example, it would be useful to provide
5 collaborative filtering-based recommendations (“People Who Selected
This Content Also Selected . . .”) without raising the hackles of privacy
interests or running afoul of legal restrictions. In addition, there are other
legitimate and useful reasons to collect information from viewers (for
example, to provide information about viewership, ratings, and other
10 audience characteristics), but in the past, such efforts have conflicted with
the important interests of privacy.

What is desired, but non-existent, are methods and systems that
enable the collection of information for collaborative filtering and other
legitimate purposes, but that avoid the transmission or storage of private,
15 identifiable, personal information.

It is also desirable to be able to generate multi-dimensional user
profiles without the necessity of collecting or storing personal information.

SUMMARY OF THE INVENTION

20 The present invention provides methods and systems for collecting
and aggregating information from user terminals, such as set-top boxes
(STBs) that may employ electronic programming guide (EPG) features,
without the necessity of collecting or storing personal, private user
information. The invention also enables collaborative filtering and the
25 generation of recommended future decisions based on anonymous user
profile information.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

Features and advantages of the present invention will become apparent to those skilled in the art from the description below, with 5 reference to the following drawing figures, in which:

FIG. 1 is a block diagram illustrating an STB/server environment in which the present invention can be implemented.

FIG. 2 is a flowchart illustrating method steps of one practice of the invention.

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DESCRIPTION OF ILLUSTRATED EMBODIMENTS

Prior Art Systems: The structure and operation of conventional networked systems, such as those using a server and subscriber terminals (including set-top boxes (STBs), EPG/IPGs, monitors, pointing devices 15 and other control devices), are well-known in the art. Examples are set forth in the U.S. and foreign patent documents listed above, the teachings of which are incorporated herein by reference as if set forth herein in their entirety.

Present Invention: FIG. 1 is a block diagram showing an example of 20 an environment in which the system and methods of the present invention may be deployed. As shown in FIG. 1, consumer terminal 102 (in this case, a set-top box (STB)) is in communication with server 104 via communications link 106. The STB, server, and communications link can be substantially conventional in design and construction, like those shown 25 in a number of the above-listed references listed above.

It should be noted that the present invention is not limited to use with STBs and television systems, but can be used in conjunction with any manner of content- or information-distribution systems, including those utilizing the Internet, cable television systems, satellite television distribution systems, and the like.

5 FIG. 2 is a flowchart illustrating the steps of a method according to the invention, which may be deployed in the architecture of FIG. 1.

In the illustrated embodiments of the invention, each consumer terminal 202 (in the illustrated embodiments, a set-top box (STB) or the 10 like), constructs and maintains a digital profile summarizing interests and decisions made on that terminal.

Alternatively, the STB may store separate profiles for each individual who uses the STB.

These profiles may be generated using known methods described in 15 the prior art, such as the Yuen WIPO publications listed above, which are incorporated herein by reference in their entirety, as if set forth completely herein.

Whenever a user decision is made, the STB transmits the profile, together with the decision, to a central server in a step 204. The 20 transmitted information contains no information that is personally identifiable. The profile (and if sent, the latest decision information) becomes an anonymous proxy for the user.

Upon receiving this information, the server can average the profile with several (or many) similar profiles in step 206, thereby to erase or 25 “blur” any remaining traces or suggestions of personal information, and to

make it substantially impossible to track the source of any decision, even if the content of the STB is later exposed.

In step 208 the (possibly modified) silhouette, together with the decision made, can be stored in a central database.

5 Next, a program running on the server can process the decisions collected from the participating STBs, and based on the processing, generate recommendations of decisions for various profiles in a step 210. For example, the server might generate a recommendation for Super Bowl programming for users whose profiles indicate high interest in National
10 Football League sports programming.

In step 212, these recommended decisions are then broadcast back to the consumer terminals/STBs.

A program operating on the STB can then compare the profiles of the transmitted recommendations with the profile current in use, and use
15 those which have similar profiles in a step 214.

Those skilled in the art will appreciate that many variations of the described embodiments may be utilized. For example, instead of a single decision, a multiple-decision action set or a summary of the most recent N actions could be transmitted.

20 Alternatively, the invention could be practiced without the most recent action set or decisions.

In addition, if personal information is inadvertently transmitted by the STB, it could be stripped off electronically using known techniques and discarded prior to storage and processing of the profile information.

25 The information that can be collected using the present invention can be used for collaborative filtering, and can also be used in numerous